

1. A drag reduction channeled apparatus attached to an upper surface of a rear portion of a roadway vehicle to collect smooth air from above the roadway vehicle and forcibly channeled into a low pressure void behind said roadway vehicle during travel, each said drag reduction channeled apparatus comprising:

5 a tapered intake manifold attached to said upper surface of said rear portion of said roadway vehicle, said intake manifold having an enlarged intake portion and a reduced transfer end; an elbow having an intake end adapted to fit within the reduced transfer end of the intake manifold, a bent portion and an output end;

10 a downdraft duct having a receiving end connecting to the output end of the elbow, a flow portion including a draft vent opening to provide flow enhancement to the downdraft duct, and a terminal end having a ramped exhaust port including an internal deflector ramp to direct air flowing through the downdraft duct outward in a horizontal plane, the terminal end having a removable dispersion screen; and

15 a connector brace connecting and covering the receiving end of the downdraft duct and the output end of the elbow, the connector brace and the downdraft duct attaching to a rear panel of the roadway vehicle.

2. The drag reduction channel apparatus, as disclosed in Claim 1, wherein said drag reduction channel apparatus is supplied as a tandem pair, with said intake manifolds set side by side on said rear of said upper surface of said roadway vehicle, with said elbows and said downdraft ducts parallel in attachment to the rear panel of said roadway vehicle.

5

10

15

20

3. The drag reduction channel apparatus as disclosed in Claim 1, said intake manifold further comprising:

said enlarged intake portion is rectangular including a straight front edge with at least two internal support fins aligned perpendicular to said front edge attaching to a lower surface of an upper panel, at least two air deflection ramps attaching to inner surfaces of opposing tapered side panels, each air deflection ramp further diverting air within said intake manifold away from said side panels prior to the air flowing within said intake manifold reaching said transfer end of said intake manifold;

said transfer end of said intake manifold is rectangular and substantially smaller in size than said enlarged intake portion, said transfer end preferably at least five times smaller than said enlarged intake portion of said intake manifold; and

attaching flanges extending outward from said side panels, each said attaching flange having a plurality of holes through which said intake manifold is attached to said upper surface of said rear portion of said roadway vehicle.

4. The drag reduction channel apparatus as disclosed in Claim 1, wherein:

said elbow is made of a flexible and expandable material in at least said bent portion of said elbow;

said intake end of said elbow is slightly smaller than said transfer end of said intake manifold, adapted to fit within said transfer end of said intake manifold with said intake end of said elbow adapted to be inserted and removed from said transfer end without deformity, said deflection ramps of said intake manifold terminating slightly in front of said intake end of said elbow when fully inserted within said transfer end of said intake manifold, said deflection ramps channeling air into said intake end of said elbow and minimizing air flow around said intake end of said elbow; and

said output end of said elbow is the same dimension, size and shape as said input end of said elbow, and said output end of said elbow is also the same size, shape and dimension as said receiving end of said downdraft duct, wherein said output end of said elbow and said receiving end of said downdraft duct are mated when abutting each other.

5. The drag reduction channel apparatus as disclosed in Claim 1, wherein:

said downdraft duct has a front panel, a rear panel and two side panels;

said receiving end of said downdraft duct adapted to match and mate with said output end of said elbow;

5 said downdraft duct having attaching flanges extending from said rear panel and two side panels attaching said downdraft duct to said rear panel through a plurality of holes in said attaching flanges; and

said ramped exhaust port opening outward through said front panel, said internal deflector ramp, which is concaved and curved from said rear panel to said front panel, attaching to said  
10 two side panels, diverting the air flow outward in a horizontal plane from said rear panel of said roadway vehicle.

15

20

6. The drag reduction channel apparatus as disclosed in Claim 1 wherein the elbow a bent rectangular duct forming a ninety degree angle adapted to a box trailer having panel doors which open outward from side hinges.

5

10

15

20

7. The drag reduction channel apparatus as disclosed in Claim 1 wherein the elbow a bent rectangular duct adapted to a refrigerated box trailer having an upper surface extending beyond the rear panel of the roadway vehicle, requiring the elbow to be bent for a portion at an angle beyond ninety degrees.

5

10

15

20

8. A drag reduction channeled apparatus attached to an upper surface of a rear portion of a roadway vehicle to collect smooth air from above said roadway vehicle and forcibly channeled into a low pressure void behind said roadway vehicle during travel, each said drag reduction channeled apparatus comprising:

5           a tapered intake manifold attached to said upper surface of said rear portion of said roadway vehicle, said intake manifold having an enlarged intake portion and a reduced transfer end, said enlarged intake portion is rectangular including a straight front edge with at least two internal support fins aligned perpendicular to said front edge attaching to a lower surface of an upper panel, at least two air deflection ramps attaching to inner surfaces of opposing  
10           tapered side panels, each air deflection ramp further diverting air within said intake manifold away from said side panels prior to the air flowing within said intake manifold reaching said transfer end of said intake manifold, said transfer end of said intake manifold is rectangular and substantially smaller in size than said enlarged intake portion, said transfer end preferably at least five times smaller than said enlarged intake portion of said intake  
15           manifold, and attaching flanges extending outward from said side panels, each said attaching flange having a plurality of holes through which said intake manifold is attached to said upper surface of said rear portion of said roadway vehicle;

          an elbow having an intake end adapted to fit within said reduced transfer end of said intake manifold, a bent portion and an output end, said elbow made from flexible and expandable  
20           material in at least said bent portion of said elbow, said intake end of said elbow is slightly smaller than said transfer end of said intake manifold, adapted to fit within said reduced transfer end of said intake manifold with said intake end of said elbow adapted to be inserted



and removed from said transfer end without deformity, said deflection ramps of said intake manifold terminating slightly in front of said intake end of said elbow when fully inserted within said transfer end of said intake manifold, said deflection ramps channeling air into said intake end of said elbow and minimizing air flow around said intake end of said elbow, and said output end of said elbow is the same dimension, size and shape as said input end of said elbow, and said output end of said elbow is also the same size, shape and dimension as said receiving end of said downdraft duct, wherein said output end of said elbow and said receiving end of said downdraft duct are mated when abutting each other;

a downdraft duct having a front panel, a rear panel, two side panels, a receiving end connecting to said output end of said elbow, a flow portion including a draft vent opening, and a terminal end having a ramped exhaust port including an internal deflector ramp, a removable dispersion screen, and attaching flanges extending from said rear panel and two side panels attaching said downdraft duct to said rear panel through a plurality of holes in said attaching flanges, said receiving end of said downdraft duct adapted to match and mate with said output end of said elbow, said ramped exhaust port opening outward through said front panel, said internal deflector ramp concaved and curved from said rear panel to said front panel, attaching to said two side panels, diverting the air flow outward in a horizontal plane from said rear panel of said roadway vehicle; and

a connector brace connecting and covering said receiving end of said downdraft duct and said output end of said elbow, said connector brace and said downdraft duct attaching to a rear panel of said roadway vehicle.

9. The drag reduction channel apparatus as disclosed in Claim 8, wherein said drag reduction channel apparatus is supplied as a tandem pair, with said intake manifolds set side by side on said rear of said upper surface of said roadway vehicle, with said elbows and said downdraft ducts parallel in attachment to the rear panel of said roadway vehicle

5

10

15

20

**10.** The drag reduction channel apparatus as disclosed in Claim 8 wherein the elbow a bent rectangular duct forming a ninety degree angle adapted to a box trailer having panel doors which open outward from side hinges.

5

10

15

20

11. The drag reduction channel apparatus as disclosed in Claim 8 wherein the elbow a bent rectangular duct adapted to a refrigerated box trailer having an upper surface extending beyond the rear panel of the roadway vehicle, requiring the elbow to be bent for a portion at an angle beyond ninety degrees.

5

10

15

20